The Wood Collection— What Should Be Its Future?

A wood collection maintained for scientific purposes is much the same as an herbarium in that it contains a preserved portion of a plant with associated documentation filed in an organized manner. By and large, wood collections so defined, are maintained by institutions rather than by individuals. There are about 14 wood collections in the United States housed in almost as many institutions. In the entire world there are only 115 institutional collections of wood. Pre-eminent in terms of numbers of specimens is the collection housed at the U.S. Forest Products Laboratory in Madison, Wisconsin where there are about 100,000 woods.

Until a few years ago, there were six major collections of wood in the United States: the Samuel James Record Memorial Collection housed at the School of Forestry, Yale University; the Harry Philip Brown Memorial Wood Collection at the New York State College of Forestry, Syracuse; the collections at the Field Museum of Natural History, Chicago; the collections at the U.S. Forest Products Laboratory, Madison; the woods at the Smithsonian Institution, Washington; and the woods forming the collections at Harvard University. Today, only four of these collections survive at the founding institutions: the Brown Wood Collection at Syracuse, the Smithsonian collections, the wood collections at Harvard, and those at Madison. The Field and Yale collections have been consolidated with those at the U.S. Forest Products Laboratory.

The wood collections of the Field Museum in Chicago were among the first collections of any kind at the Museum and they formed the original material of the world-renowned economic botany collections. Following the dismantling of the displays which comprised the World Columbian Exposition at Chicago in 1893, much of that material was transferred to form the nucleus of the collections at the Field Columbian Museum which was established shortly after the great exposition. The first curator of botany was Dr. Charles F. Millspaugh, a West Vir-

ginian, who had served on the jury of awards of the World Columbian Exposition. He was responsible in large part for the collections resulting from the Exposition which were left to the newly founded museum. The first exhibit materials of the Department of Botany of the Museum consisted of exotic woods, in the form of boards, remaining from the Exposition. These were put on display in 1894 in what had been the Fine Arts Building of the World Columbian Exposition.

Millspaugh augmented the exotic woods derived from the Exposition with native woods from the United States, and some of the earliest collecting activities of the Department of Botany were dedicated toward this end. Millspaugh himself participated in these early expeditions and travelled to the southern states, Louisiana and Mississippi, for example — during the winter, of course. Later, additions to the collections were made through the efforts of Huron H. Smith, a loner, who collected wood specimens with herbarium vouchers from distant parts of the United States, particularly on the West Coast. It was these woods, in the form of boards and tree trunks, and herbarium specimens, which formed the basis for the displays in the Museum's Hall of North American Woods. After his tenure at the Field, Smith accepted a curatorship at the Milwaukee Public Museum.

Exotic woods were also gathered for the Museum, notable among which were the collections of Llewelyn Williams from Peru and Acosta-Solís from Ecuador. But, as originally, most of the wood specimens were used primarily as examples of economic products of plants and to serve as bases for displays of useful timbers.

Llewelyn Williams had travelled to Yale where he took courses in wood anatomy and identification under the tutelage of Professor Samuel J. Record. Subsequently he returned to the Field Museum where he undertook studies in wood anatomy until the beginning of World War II. Williams' work on the woods of northeastern Peru, published in 1936, resulted in part from these studies and from his field work in Peru. But, Williams' investigations were probably the only research in the comparative anatomy of wood based on the Field collections actually carried out at the Museum. Nevertheless, collections of wood continued to be amassed in the hopes that there would be a full-time curator of dendrology or a wood anatomist on the staff to organize and direct a viable program of research in wood structure which could be carried out *in situ*. Those who had charge of the collections over the years — Llewelyn Williams, B. E. Dahlgren, John W. Thieret, Theodore Just, Louis O. Wil-

liams, and research associate Archie Wilson — made the specimens available for study elsewhere by botanists and others with an interest in studying wood structure, while at the same time they continued a holding operation for the future of the Museum.

It finally became apparent that chances of establishing a program based on wood study at the Field Museum were remote. Reluctantly, after more than seven decades, the wood collection proper was turned over to the U.S. Forest Products Laboratory in 1971 where it was hoped more use could be made of the specimens than was possible in Chicago.

The exhibits of North American timbers are still being maintained in a revitalized and decorative format. This amazing series of cases, containing dioramas and displays on the botanical aspects and economic products of woody plants, constitute the most complete pictorialization of the raw material of our forest resources in any museum today.

The wood collection previously housed at the School of Forestry, Yale University, was begun almost coincident with the founding of the School itself and records show that a collection existed in New Haven in 1901. However, this group of specimens was burned in 1903 and the now famous Record Memorial Collection had its origin in 1905. Samuel James Record joined the faculty of the School in 1910 and in 1917 he was appointed Professor of Forest Products. His immense interest in woods sparked several trips to the tropics — Guatemala, Honduras, British Honduras — and to many portions of the United States for purposes of observing forest trees and for the collection of wood specimens. It was Record, primarily, who elevated wood collecting from its former status of guesswork and curio gathering to a truly scientific occupation. He insisted that samples of wood be accompanied by determinable herbarium specimens gathered from the same tree and thus associable with described species of plants. These voucher specimens were kept at the Forestry School, adjacent to the woods, where they could be consulted as the need arose.

By 1916 a committee of the Yale Corporation voted to recommend for favorable consideration the formation of a department of tropical forestry at the School with appropriate support in terms of finances, faculty, laboratory, museum furniture, and so forth. An important arm of the department was to be the museum and collection of tropical woods begun by Professor Record. In 1928, Record had already assembled the then incredible number of 11,000 specimens of wood, largely from

tropical regions. The size of the Yale collection in 1928 was larger than most institutional wood collections of the present time.

Record's success in obtaining wood specimens was not only brought about through his own activities in the field; he had an enormous correspondence and he must have been a very stimulating and persuasive man. He was able to secure financing from external organizations which he used to provide stipends for botanists and foresters in the field so that they could gather woods for him; he helped many United States and Latin American botanists with their endeavors in the tropics, for example, through modest subventions for the collection of wood specimens. It was Record who helped to support the field work of G. Proctor Cooper in Liberia, Panama, and Costa Rica; of Hugh Curran in Argentina, Brazil, and Venezuela; of Armando Dugand in Colombia; and of Adolpho Ducke in Brazil. By the time Record died in 1945, the collection amounted to over 40,000 specimens, far and away the largest and probably best collection of its kind in the world.

Record founded the journal *Tropical Woods* which was published more or less uninterruptedly from 1925 until 1960. He also wrote the two most important works on the woods and forests of the New World, *Timbers of Tropical America* in 1924 and *Timbers of the New World* in 1943. In addition, Record authored several books on the physical and mechanical properties of wood and on the description and identification of wood. His research output was voluminous, much of it being published in *Tropical Woods*.

Record established a unique form of exchange with Professor Laurence Chalk, then in charge of the wood collection at the old Imperial Forestry Institute, Oxford University. In return for specimens of wood, Chalk arranged to have permanent microscope slides prepared of them, which were returned to Record. These slides formed the basis of the large collection associated with the woods at Yale.

Service was also an important part of the work done in conjunction with the collections at New Haven. Many thousands of specimens were distributed as duplicates on exchange to other collections and as small samples for microtome sectioning and research. Record himself performed wood identifications for lay people as well as for the government and industry, for botanists, anthropologists, and foresters. The collections also formed a basis for studies in the utilization of tropical woods and as demonstration specimens in teaching.

Following Record's death in 1945, the curatorship was held for a few years by Record's protege, Robert W. Hess. But Hess left Yale to join industry in the early 1950's, and following an interim appointment of the then retired Arthur Koehler, I assumed the responsibilities of the curatorship; teaching and research in wood anatomy and identification, tropical forestry, and microtechnique; editing *Tropical Woods*; and of the service work which seemed to be received unabated even in 1953 owing to the vast reputation of Samuel Record.

The entire program of research in tropical woods and tropical forestry was made possible by the activities surrounding the great collection of woods. It was an integrated program embodying several facets of endeavor: research, teaching, publication, and service. But these activities had only been viable owing to interests and efforts of the curators of the wood collection and not to any great impetus or encouragement from the School or the University. Following my departure from the School of Forestry in 1960, the entire program so ably commenced and overseen with such vigor and excellence by Samuel Record, fell apart. The new wood anatomist had little interest in the tropics and even less in the "busy work" of curating woods and editing a scholarly publication. Thus, the collection became remote and difficult to consult, *Tropical Woods* discontinued publication permanently, and ultimately the administration of the Forestry School, seeing no hope for a future program, transferred the wood collection to the U.S. Forest Products Laboratory in 1969.

Wood collections at the New York State College of Forestry, Syracuse, came into being shortly after the arrival of Harry Philip Brown in 1917 or 1918. The exact date of accessioning of the earliest specimens is unknown. Brown used these woods in his teaching of wood identification and in his publication, *Atlas of the Commercial Woods of the United States*, which appeared in 1928. Many of these early woods were not authenticated, that is, they were not associated with herbarium vouchers. It was Brown himself who made the early collections and others contributed specimens as well: William M. Harlow, Ellwood S. Harrar, and S. B. Detweiler of the U.S. Forest Service. Later specimens were collected with herbarium vouchers which were not, however, housed at the College; rather, they were deposited at the U.S. National Herbarium, in the herbarium of the Arnold Arboretum, and in the herbarium of the New York Botanical Garden. Records of deposition were maintained at the College.

In the 1920's, at the request of the British Colonial Office, H. P. Brown visited India to organize a botanical section and laboratory for the study of wood at the Forest Research Institute and Colleges, Dehra Dun. There, Brown had the opportunity to work with and to become familiar with Indian timbers through the famous Gamble Collection. He remained in India for a year and a half and following his return to Syracuse, in 1932 he and R. S. Pearson, published the monumental two-volume work on Indian timbers, *Commercial Timbers of India.*

Besides the use of the Syracuse collections for teaching, considerable service and research in wood anatomy was also carried out: R. A. Cockrell worked on *Strychnos* and studied woods from Sumatra collected by B. A. Krukoff; E. S. Harrar studied the woods comprising the Queensland (Australia) Forest Service collections; Luis J. Reyes studied Philippine woods and in 1938 produced a volume on Philippine timbers; Kafil. A. Chowdhury worked on Indian woods; and A. J. Panshin's research in anatomy involved collections from West Africa. H. P. Brown attracted many students and there was a very active program in the study of wood structure.

At the present time, Professor Carl de Zeeuw is curator while at the same time he teaches courses in wood structure, identification, and utilization. There is still a modest program of incorporation of new specimens and some small amount of research in wood anatomy is carried out. A major effort, at this time, involves the continuing authentication and accessioning of wood specimens already on hand, since many woods were received in the past with but little documentation, despite collection by well-known botanists such as Joseph Rock.

A word must be inserted here about the program of collecting, known at the New York State College of Forestry as "Project I". This project, spearheaded by H. P. Brown, was an attempt to collect wood specimens, ecological and habit data, and herbarium vouchers, from all the woody plants growing within the continental United States. To this end, Brown enlisted the aid of collectors from all parts of the country and in return for duplicate specimens these persons were asked to gather appropriate material from the forest trees native to their parts of the country. Accordingly, botanists, foresters, range and wildlife managers, were "drafted" to help with this monumental undertaking. Although at first Brown only admitted woods of commercial or potential commercial use, he later relented and the more recent collections comprise material from all woody plants. The project is still being carried on to a modest degree

and to date there are over 850 collections. Duplicate sets of the wood specimens have been distributed far and wide and the herbarium vouchers and associated documentation are deposited in the herbaria mentioned above.

The wood collection presently housed at the U.S. Forest Products Laboratory at Madison was founded sometime prior to 1910 by Arthur Koehler, the notable "expert on wood" at the Lindbergh kidnapping trial in 1935.

Woods were then housed in Washington, D.C. before the construction of the present facilities in Madison. Initially, the collections were strictly of native forest trees. In those early days the specimens were used predominantly as comparative material for identification and only secondarily for research, description, and the construction of keys. Present emphasis at the Forest Products Laboratory is much the same as it was in 1910, that is, most of the activities are devoted toward the identification of wood specimens and the maintenance of the wood collections themselves. For example, there are on the average over 1000 inquiries during a typical year and these amount to some 4000 identifications.

Arthur Koehler worked closely at the Laboratory with Eloise Gerry, a classmate at Columbia University of the anatomist-morphologist-geneticist, Edmund Sinnott. When Koehler retired, his position was assumed by B. Francis Kukachka, who had been at the Laboratory since 1945, and who is now in charge of the program of service and research associated with the wood collections. The major emphasis at the U.S. Forest Products Laboratory has always been service to the public, largely in the form of identifications. To this end, the Laboratory amassed a collection of specimens of wood, many consisting of pie-shaped radial segments, which numbered about 23,000 specimens in 1967. With the addition in 1969 of Yale's Record Memorial Collection of 55,000 specimens and subsequent augmentation in 1971 of the Field specimens comprising 18,000 specimens, the wood collections at the Forest Products Laboratory now number about 100,000 specimens, easily the largest wood collection in the world.

With this great and rather precipitous increase, the wood collections, associated staff, and facilities at the Laboratory have been styled by the Director as a "Center for Wood Anatomy Research". It is hoped, with this vast increase in physical assets in terms of wood specimens, that there will be additional staff beyond the two permanent staff members now associated with the wood collection to enable an increase in activities, primarily

in the field of codifying information on wood structure for incorporation into a program of data processing. Work continues to integrate both the Yale Record collections and the Field collections into the already existing specimens at the Forest Products Laboratory. The herbarium of voucher specimens once housed at Yale is being intercalated among other vouchers already housed at the Forest Products Laboratory.

Wood collections at the Smithsonian Institution were originally part of the Division of Arts and Manufactures of the Museum of History and Technology, and it was not until 1960 that they were transferred to the Department of Botany in the Museum of Natural History at the urging of Albert C. Smith, then Director of Natural History. In 1915, when the first wood specimens were catalogued, they were associated with the industrial and manufacturing sections of the Museum. Subsequently, they were stored next to an exhibit hall devoted to the commercial aspects of wood. The first curator, William N. Watkins, had been graduated from the New York State College of Forestry and his primary outlook was that of a wood technologist and expert in wood utilization. Accordingly, he was occupied in the amassing of specimens primarily for use in identification and service to the public. Specimens were made available to botanists and others who required material for their research in wood structure, but Watkins himself, over a tenure of 43 years, did not carry out any research based on the wood specimens. His major contribution to the Smithsonian Institution was designing the exhibit hall noted above over which he held domain until it was demolished in 1960 at the time of his retirement from government service.

The first collections of wood at the Smithsonian were those gathered by the botanist Henri Pittier and they came from forest trees of Panama. All were associated with herbarium vouchers deposited in the U.S. National Herbarium. For a long time, many subsequent accessions were duplicates of those at Yale, and Samuel Record kept the Smithsonian Institution well provided with specimens. In addition, many other excellent collections were catalogued, for example: B. A. Krukoff's Brazilian, West African, and Sumatran material; the Project I set of the New York State College of Forestry; the entire private collection of Archie F. Wilson; collections of José Cuatrecasas from Colombia; Llewelyn Williams' Peruvian woods; and my own collections from Panama, the Philippines, Hawaii, and Dominica.

In 1960, at the time the collection was transferred to the

Smithsonian Department of Botany, I was appointed curator of the wood collection which then numbered 15,000 specimens. The wood collection became the basis for a Division of Woods (later changed to Division of Plant Anatomy) and an active program of research in wood anatomy was begun. A modest amount of service work in identification was continued. Watkins had accumulated many thousands of duplicate wood specimens over the years and all these were distributed on exchange shortly after the commencement of my tenure. Two other staff members were added in the next several years, Richard H. Eyde and Edward S. Ayensu. When I left the Smithsonian Institution to return to university teaching in 1967, the collection of woods had grown to over 35,000 specimens. Presently, there is little research in wood anatomy *per se* being carried out in the laboratories at the Smithsonian Institution, but there is still an active program of accessioning and many blocks are sent on request to botanists and others interested in studying comparative wood anatomy. The collections are in excellent condition, carefully catalogued, and readily available to any who need them.

The wood collections housed in the Herbarium Building at Harvard University owe their origin in large part to the work of Irving W. Bailey and W. W. Tupper. In conjunction with their early studies on size variations in tracheary cells, Bailey and Tupper were obliged to amass a diverse and sizeable collection of woods upon which to base their observations. This began sometime before 1918 and accretion of specimens has continued until the present time. According to my present information, the woods obtained and used by Bailey and Tupper in their pioneer investigations were not necessarily associated with herbarium vouchers. More recently, of course, most of the accessions have consisted of wood specimens associated with herbarium vouchers many of which are deposited in the Harvard University Herbaria.

The principal activities which have centered about the Harvard wood collections have always been predominantly research-oriented. For several decades following 1918 there was a steady stream of what have proved to be the most significant and far-reaching investigations in plant evolution, based upon the study of wood anatomy, ever carried on in any institution. Not only were these investigations carried on personally by I. W. Bailey, but many of the botanists who studied at Harvard University used these specimens as bases for their own researches, both while they were students or fellows at Harvard, and subsequently. Names of these individuals represent some

of the luminaries in botany today: Wetmore, Barghoorn, Heimsch, A. C. Smith, Carlquist, Tippo, Howard, and Cheadle, and their students of the second generation. The impact of anatomical studies associated with the Harvard wood collections is difficult to assess quantitatively, but it has already had a profound influence on interpretations of plant relationships and phylogeny. No botanist interested in these aspects of study can afford to overlook or casually consider the work of I. W. Bailey and the Harvard plant anatomists.

Service work, although carried on in conjunction with the collections, was indeed second to research and publication, and teaching. It is important to note here, even though his prodigious energies were mainly directed to anatomical research, Bailey was not an intellectual snob who had no real interest in the practical aspects of his profession. For example, with H. A. Spoehr he published on the role of research in the development of forestry in North America in 1929, and a number of his early papers reflected his appreciation of the pragmatic value of woods and forests.

Specimens in the Harvard collection resulted from the quests of Bailey and Tupper in the early days, and from the collections of other botanists later on. Once the collection became established, and it was known that this was one of the major repositories for woods to be used in research and teaching, materials arrived from many sources. Albert C. Smith deposited a set of his Fiji wood specimens there, for example. A set of B. A. Krukoff's Brazilian woods is lodged at Harvard; Llewelyn Williams deposited a set of his Peruvian woods; and there is a set of the Jesup Collection woods of the United States prepared earlier under the supervision of Charles Sprague Sargent. There are groups of woods from various foreign forestry departments, particularly from Borneo and Sarawak. Unlike the Record Collection at Yale, special emphasis at Harvard was given to Asian material. Much of the publication resulting from studies of these woods appeared in the *Journal of the Arnold Arboretum*, particularly the later investigations of I. W. Bailey, his students, and co-workers.

The Harvard wood collection now numbers somewhat over 25,000 specimens of dried woods. Besides dried wood specimens, the Harvard collections also comprise fluid-preserved specimens and permanent microscope slides containing sections of wood. In a report submitted by Professor Ralph H. Wetmore to Elmer D. Merrill, Director of the Arnold Arboretum, entitled "Annual Report for the Wood Collection, Biological Laboratories"

1940–1941, there were recorded 9,324 fluid-preserved specimens, 11,857 dried specimens, and 24,382 microscope slides.

Since Bailey's retirement and death in 1967, activities both in the accumulation of specimens and in research had declined. Responsibility for the collection has devolved to the present Director of the Arnold Arboretum, Richard A. Howard, and it is through his good offices and personal interest in plant anatomy that specimens are made available to botanists on request for their own researches in comparative plant anatomy.

If we examine the present status of the six major wood collections of a few years ago, the first observation to make is that Yale's Record Memorial Collection and the Field Museum Collection no longer exist as such. Secondly, the research, education, and service activities associated with the Brown Memorial Collection, the Smithsonian Institution collections, and the Harvard collections have diminished over what they were a relatively few years ago. This leaves the collections of the U.S. Forest Products Laboratory, recently augmented by the additions of wood specimens from Yale and from the Field Museum. But, even here, where the traditional emphasis has been on service, the two-man professional staff is hardly able to care for the many curatorial responsibilities and at the same time to provide necessary service to the public and industry. Naming an institution a "Center for Wood Anatomy Research" does not in itself bring one into being. The plain fact of the matter is that wood collections and their associated activities are not being fully supported by the institutions of which they are a part.

There is some argument for a continued consolidation of wood collections, such as has recently taken place at the Forest Products Laboratory, and on the face of it, it seems eminently logical: greater resources in terms of specimens, expanded services and research through increased staff, heightened productivity through enlarged physical facilities — laboratories, libraries, workshops, and the like. There are also cogent arguments against consolidation: centralization raises the possibility of control; destruction of all resources through natural or man-made catastrophe is more likely; research carried on in a single institution is more conducive to channelization.

All of this is academic wool-gathering when we view today's trends in the upkeep of collections of all kinds, not just wood collections. It is a fact that there is a growing impetus for different types of institutions to transfer their study collections to other institutions, owing not only to lack of funding and the related problem, lack of space, but to a lack of interest on the

parts of practitioners to continue the kinds of activities which were once associated with the collections. I maintain that if the practitioners were deeply interested in the collections and dedicated to using them as bases for service, research, publication, and education, institutions would make adjustments to enable the continued maintenance of the collections for the purposes noted above. Basically, it is lack of involvement with the collections that permits administrators to temporize and to cast greedy eyes on space occupied and monies expended, both of which can always be diverted to other "more pressing" needs.

The activities which surround wood collections are subject to the same human whims which accompany any other endeavor. What is exciting today fails to excite our followers. There is inherent glamour in new fields of effort and in new methods, despite the fact that older lines of effort and approach are far from being exhausted and yet have much to yield. We seem always to be seeking the untapped vein when present veins are still ripe with unexplored potential. Thus, the halcyon days, when H. P. Brown, S. J. Record, and I. W. Bailey were pursuing their studies of wood based on their collections, have become attenuated and we find ourselves at a crossroad. We may ask ourselves: what should be the future of wood collections? Do they indeed have a future? Where can they exist and still serve their traditional functions while promoting expansion into new avenues of endeavor?

At this point I must admit my total bias toward the maintenance of wood collections and the continuation and enhancement of scientific activities based upon them. Wood collections represent the only preserved, unadulterated, and uninterpreted sources of facts through which it is possible to study the construction of the axis of the woody plants which clothe much of the surface of the earth. If we were only and exclusively concerned with the maintenance of wood specimens as a record or hedge against the present rapid diminution of our natural resources, I would say this is reason enough to keep these collections as a form of evidence of the natural products of the earth. But, of course, this would be a narrow view; nevertheless, I believe it to be valid and supportable if we but look into the future with an eye on the past.

Except where wood collections exist primarily to serve the public need, they have flourished owing predominantly to the interest and dedication of single persons: H. P. Brown, I. W. Bailey, and S. J. Record, for example. What was lacking then and what is lacking now, is institutional appreciation of wood

collections and institutional commitment to their maintenance. Admittedly, these are frail requirements, but at least they are superior to the commitments of men who, after all, are shorter-lived than institutions. The great museums have the best records for institutional commitment, but as we have seen, even these are not immutable. In the final analysis, then, we can only trust to good faith, the wisdom of administrators and scientists, and chiefly a concern for the future, for the continued existence of wood collections, or for that matter, any other organized collection of natural and cultural products.

One may reasonably ask then, where can wood collections and allied activities be supported in the most favorable environment? I believe the answer to this question depends on the activities which are associated with the wood collection, and not on the collection of woods, as such. I will be frank to admit that service work, in the form of identifications, is a price one pays for being affiliated with any collection. However, unlike the determination of herbarium specimens, bird skins, or mammal pelts, the act of identifying a wood specimen is not a totally satisfying experience, at least not to me. A wood specimen, at best, is only a fragment of an organism and the most accurate identification of the plant from which it was derived really depends on a determination made from a complete herbarium specimen. So, identifying a piece of wood lacks the pleasure attendant upon the identification of a herbarium specimen, and thus the species of plant.

It is true that wood identification can be extremely important commercially and forensically, and it is often a major ethnobotanical and paleobotanical tool. But, many of the pieces of wood for which identification is required as a service come from curiosity seekers wanting to know the name of a bit of driftwood picked up on the beach during a summer vacation or uncovered in a garden. There should be a place where this kind of wood collection-associated activity can be carried on, and that place is probably a government-supported agency such as the U.S. Forest Products Laboratory. Indeed, as noted above, service of this kind has been the mainstay of activity in the wood collection at the Forest Products Laboratory, and I believe, as far as wood collections are concerned, that the Laboratory can perform its greatest service to the public and to industry by continuing this type of effort.

Scientific research, publication, and education associated with wood collections, I believe are carried out most effectively in the inquisitive and stimulating atmosphere of the university,

well apart from directed research and service-oriented drudgery. Ideally, the wood collection should find its most sympathetic support in an institution which has some kind of commitment to the study of trees and other woody plants; that is, an arboretum, botanical garden, a department of botany, or a school of forestry. Thus, we have found in the past, in the United States the most active research in wood anatomy has taken place within the university milieu, at the Yale School of Forestry, at the New York State College of Forestry, and at Harvard University with its Arnold Arboretum and program of study in forest trees. Professor Laurence Chalk's work prospered at the Imperial Forestry Institute at the University of Oxford in England. It is also worth pointing out here that other important programs of research in wood anatomy have been associated with non-university botanical gardens, for example, at the Jodrell Laboratory, Kew, and at such museum-oriented organizations as the Smithsonian Institution. It is up to the staff members of these organizations where there has been a commitment to the study of woody plants and where there is a framework already in existence in terms of a wood collection, to reinvigorate and revitalize research and education in wood anatomy. Lest I am accused of being a wood anatomy bigot, let me hasten to say that I do not believe that studies in wood anatomy can remain viable in a vacuum; rather, they must be integrated with other studies in plant anatomy and with other phases of botanical endeavor.

Assuredly, it is incumbent upon individual botanists to dedicate themselves to the achievement of commitments from institutions concerning wood collections, their associated activities, and their continued existence and increase. Without sincere, vigorous, and persistent involvement of botanists, the present trend toward consolidation of wood collections will swell concomitantly with attrition in basic scientific research. And all that will remain among the ashes will be the mundane service activities required to provide identifications for the curious public, for government, and for industry.

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